Expressed emotion and behaviourally controlling interactions in the daily life of dyads experiencing psychosis

Debora Vasconcelos e Sa*[a], Alison Wearden[b], Samantha Hartley[a], Richard Emsley[c] and Christine Barrowclough[a]

[a] School of Psychological Sciences, The University of Manchester, Manchester, UK

[b] School of Psychological Sciences & Manchester Centre for Health Psychology, The University of Manchester, Manchester, UK

[c] Centre for Biostatistics, The University of Manchester & Manchester Academic Health Science Centre, Manchester, UK

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* Corresponding author: Debora Vasconcelos e Sa, School of Psychological Sciences, University of Manchester, 2nd Floor Zochonis Building, Brunswick Street, Manchester, M13 9PL, UK, debora.v.sa@alumni.manchester.ac.uk

Highlights

- Patients' self-reports of their relatives being behaviourally controlling in the course of everyday life, namely taking control of them or helping them, were associated with higher levels of negative mood and symptoms.
- Relatives' self-reports of behaviourally controlling interactions such as nagging, keeping an eye on the patient or taking control of the patient were significantly linked with fluctuations in relatives' mood, but not with patients' symptoms.
- Contact with high-EE relatives (critical and overinvolved), had no association with patients' affect or symptoms in the course of daily life.

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While research using Experience Sampling Methodology (ESM) suggests that, in general, contact with relatives or friends may be protective for psychotic experiences, contact with high-Expressed Emotion (high-EE) relatives can have adverse consequences for patients. This study investigated whether contact with high-EE relatives, and relatives' behaviourally controlling interactions (BCI) are related to patients' symptoms and to both patients' and relatives' affect when measured using structured diary assessments in the course of everyday life. Twenty-one patients experiencing psychosis and their closest relatives provided synchronized self-reports of symptoms (patients only), affect, dyadic contact and BCI over a 6-day period. Relatives' EE was obtained from Camberwell Family Interviews. Multi-level modeling showed that patients' reports of relatives taking control of them and helping them were associated with increased patient negative affect and symptoms. Relatives' self-reports of nagging, taking control and keeping an eye on the patient were related to fluctuations in relatives' affect. No evidence was found for the moderating effect of EE status on the association between dyadic contact and affect or, in the case of patients, symptoms. When measured using an ecologically valid methodology, momentary behaviourally controlling interactions within dyads experiencing psychosis can impact on patients' affect and symptoms.

Keywords: Expressed Emotion (EE); Psychosis; Experience Sampling Methodology (ESM); behavioural control; Ecological Momentary Assessment (EMA).

1. Introduction

'Real world' momentary assessments, obtained using experience sampling methods (ESM; Csikszentmihalyi and Larson, 1987), have been employed to investigate the impact of social contact on the experience of psychotic symptoms in individuals at risk of and experiencing psychosis (Collip et al., 2011; Myin-Germeys et al., 2001b; Verdoux et al., 2003). ESM involves participants providing brief self-reports of their thoughts, affect and activities when prompted by random beeps that occur throughout the day. Some ESM studies suggest that being in the company of familiar others, namely relatives or friends, may have a protective effect for the development and occurrence of psychotic experiences. For example, Myin-Germeys (2001b) used ESM to examine the social company of individuals diagnosed with schizophrenia, and found that being in the presence of familiar acquaintances, rather than being alone or with strangers, decreased the risk of subsequently experiencing delusions. Verdoux (2003) extended this finding to a non-clinical population by showing that individuals with high vulnerability to developing psychosis were at a lower risk of unusual experiences when in the presence of family members or friends. Similarly, Collip (2011) found that individuals at risk or with medium levels of trait paranoia reported increased paranoid thinking in less-familiar company.

However, Expressed Emotion (EE) research demonstrates that certain family environments can negatively impact on psychotic experiences. Relative's EE is usually coded by a trained rater from the Camberwell Family Interview (CFI; Vaughn and Leff, 1976). Ratings of relatives' critical comments, hostility and emotional overinvolvement (EOI) are used to designate relatives as high/low-EE. Well-replicated research findings indicate that being in family environments where at least one member is assessed as high-EE can negatively impact on patients' psychotic

experiences (Hooley, 2010). Face-to-face contact with high-EE relatives has been consistently associated with increased risk of psychotic relapse (Butzlaff and Hooley, 1998). Similarly, psychophysiological research demonstrates that the presence of high-EE relatives is more autonomically arousing for individuals than the presence of low-EE relatives (Tarrier and Tupin, 1992). To date, it is still unclear what aspects of family interactions impact positively or negatively on symptoms in individuals with psychosis; and to our knowledge, momentary assessments have not been used to examine family interactions in EE environments. For instance, Hahlweg et al. (1989) examined interactions between people with psychosis and their relatives in laboratory settings, using videotaped family interaction problem solving tasks. They investigated whether patient-relative interactions were related to relatives' EE status, measured by the CFI at hospitalisation and by the Five Minutes Speech Sample (FMSS; Magaña et al., 1986) 5-6 weeks after discharge, and found no correlation between relatives' CFI EE status and family interactional behaviour. However, relatives designated high-EE-critical using the FMSS exhibited a more negative interaction style when discussing problems with the patient than high-EE-EOI or low-EE relatives. While this work provides valuable insights into behaviour patterns in high/low-EE relatives, it does not inform us about momentary patient-relative interactions, and how these are associated with EE, and subsequently with changes in affect and symptoms in the context of daily life. The current study will allow an ecologically valid insight into the daily interactions between dyads living in EE environments, and into how these interactions impact on psychotic symptoms and affect.

EE research shows that patients report feeling more stressed when interacting with high-EE relatives (Cutting et al., 2006), suggesting that certain interactions may directly impact on patients' well-being. Hooley and Campbell (Hooley and Campbell,

2002) found that behavioural control attempts are more prevalent in high-EE relatives. These can range from mild/moderate controlling behaviours such as keeping an eye on the patient or giving direct instructions, to more extreme responses like using coercion. An association between behavioural control and high-EE has been demonstrated both in relatives of people with long-term (Hooley and Campbell, 2002) and recent-onset psychosis (Vasconcelos e Sa et al., 2013); and Hooley and Campbell (2002) further showed that high levels of behavioural control were predictive of poor clinical outcome. Thus, it is possible that experiencing certain behaviourally controlling interactions (BCI) may act as an important stressor for people with psychosis, impacting on their affect and symptom experiences. There may also be bi-directional relationships at play, such that patients' symptom fluctuations elicit stress and BCI in relatives. However, to our knowledge these hypotheses have not yet been tested in the context of daily life.

The present study used ESM to examine the impact of contact and interactions in patient-relative dyads experiencing psychosis in the course of their daily life. First, we tested the hypothesis that both contact with high-EE relatives per se and relatives' BCI (reported by patients) would be associated with increased negative affect and symptoms in patients. Second, we examined whether relatives' contact with patient, BCI (reported by relatives) and patients' reported symptoms were associated with relatives' affect. We hypothesised that high-EE relatives would experience negative affect when in contact with patients, but this relationship would not hold for low-EE relatives. Finally, we tested whether patients' reported symptoms would be associated with increased levels of relatives' BCI.

2. Methods

2.1 Participants

Patients were aged 18-65, with a clinical diagnosis of schizophrenia, schizophreniform/schizo-affective/delusional or psychotic disorder not otherwise specified and with no evidence of primary organic disorder. In addition, patients had at least 10 hours of weekly face-to-face contact with a relative, and were receiving mental health services. To take part in the study, both participants were required to have sufficient comprehension of English, and be able to provide informed consent. Ethical approvals were obtained from appropriate research committees (10/H1015/51) All participants provided informed consent. Patients were recruited from Community Mental Health Teams and Early Intervention Services and independent patient and carer groups in the North West of England between January 2011 and March 2012. Patients were screened for the presence of psychotic symptoms using the Positive and Negative Syndrome Scale (PANSS; Kay et al., 1987) to ensure that psychotic experiences were evident and could be captured during the momentary assessments. Those with a score ≥3 on the delusions/hallucinations subscales were included. Patients meeting eligibility criteria were asked to nominate their closest relative (including a parent, partner, sibling, offspring, or grandparent). Unmatched dyads (4 patients without their relatives and 2 relatives without the patients) were also included in some analyses. The final study sample included twenty-one patient-relative dyads, twenty-three relatives and twenty-five patients.

2.2. ESM

Each participant received a Palm device (model: Tungsten E2) with ESP software (Barrett and Feldman Barrett, 2000) to deliver the ESM self-report questions, and a digital wristwatch (Timex Iron Man) to prompt synchronised completion. Following previous ESM studies guidelines (Myin-Germeys et al., 2005; Myin-Germeys et al.,

2001a), the wristwatch emitted 10 pseudo-random synchronised beeps per day between 9-12AM over 6 consecutive days (including a weekend). Timings reflected the later waking and sleeping times of those experiencing psychosis (especially out of work as this sample constitutes); and participants were asked to put the wristwatch away when they went to bed so that it would not disturb them. Participants were aware of the number of beeps per day and time range, but unaware of the beep timings, other than it would be 'unpredictable'. Patients and relatives' wristwatches were programmed to beep at the same time, and participants were instructed to complete the ESM self-report questions on the Palm after each beep. Dyads were specifically instructed to fill in the ESM reports individually and not to confer. Questions took about 2 minutes to complete on each occasion and were identical for relatives and patients, apart from the psychopathology questions (absent for relatives) and the interaction questions (which were mirrored, see Measures section).

ESM reports were considered valid if completed within 15 minutes of the prompt, although participants were unaware of this window. Entries completed outside this window were excluded from the analyses, as they are less likely to be reliable (Delespaul, 1995). A maximum of 60 ESM reports were allowed for each participant (10 per day during 6 consecutive days). Furthermore, a cut-off of 20 (out of possible 60) valid ESM reports was required for each participant for inclusion in the analyses, to ensure representativeness of the data (Palmier-Claus et al., 2010). Twenty-one patient-relative dyads, twenty-three relatives and twenty-five patients completed the ESM phase with valid reports.

2.3. Procedure

A pre-ESM phase visit was arranged at which patient consent and socio-demographic information was obtained. The PANSS (Kay et al., 1987) was administered to confirm the presence of positive symptoms. Consent to contact a relative with whom the patient had at least 10 hours of weekly face-to-face contact was requested. Where there was more than one relative, patients opted for the person with whom they had closest contact.

During the ESM briefing visit participants were introduced to the Palm, wristwatch and ESM questions. A practice trial was conducted. Participants were instructed to start completing the ESM questions the next day, and informed that the researcher would call them to ensure that the devices were functioning properly and to address any concerns. Additional optional telephone contacts during the ESM phase were offered and contact details provided.

A debriefing visit was arranged after 6 days to collect the devices and to conduct the CFI with relatives.

2.4. Measures

2.4.1. ESM measures

Affect and psychosis items from previous ESM studies with psychosis samples (deVries and Delespaul, 1989; Myin-Germeys et al., 2005; Myin-Germeys et al., 2001a) were used. In line with current recommendations (Palmier-Claus et al., 2010): 1) a slight change in wording from "*What was I … (just before the beep went off)*" to "*Just before the beep went off I was…*" was adopted in order to reflect truly momentary reports; 2) affect and psychotic experiences were assessed at the time of

the beep, whereas dyad contact and BCI were assessed at the time of the beep as well as since the last beep in order to capture all instances of the phenomena occurring.

2.4.1.1. Affect. Affect states were assessed at the current beep in patients and relatives using 11 items anchored from 1=not at all to 7=a lot. As in previous ESM studies with psychosis samples (Myin-Germeys et al., 2003c; Myin-Germeys et al., 2001a; Oorschot et al., 2012; Wigman et al., 2013), principal components analysis identified two scales: the positive affect scale (patient sample: Cronbach's ∝=0.87; relative sample: Cronbach's ∝=0.82) composed of the adjectives '*happy, cheerful, satisfied*, *excited, relaxed*'; and the negative affect scale (patient sample: Cronbach's ∝=0.83; relative sample: Cronbach's ∝=0.85) composed of the adjectives '*guilty, irritable, anxious, annoyed, sad, lonely*'. The mean scores for the items in each scale were used in the analyses.

2.4.1.2. Psychosis experiences. Experiences of psychotic symptoms were assessed at the current beep only in patients with 9 items anchored from 1=not at all to 7=a lot. The psychosis symptoms scale (Cronbach's ∝=0.91) was comprised of the items "*Just before the beep went off I was… hearing voices; seeing things (that other people cannot see); feeling that someone may try to cause me harm; suspicious; afraid I could lose control; unable to get rid of my thoughts; feeling unreal; feeling that my thoughts are being influenced or controlled; finding it difficult to express my thoughts.*" The mean score of the 9 items was used in the analyses.

2.4.1.3. Dyad contact. In line with other ESM interaction studies (Janicki et al., 2006; Larson et al., 1994), dyad contact was defined as directly spending time or doing

things together, including telephone or Internet voice/image (e.g. Skype) contact. To ensure that all contact was captured participants reported (Yes/No) to the items: "*Just before the beep went off I was… & Since the last beep I have been with the other participant"*.

2.4.1.4. Dyad behaviourally controlling interactions (BCI). Following current guidelines (Palmier-Claus et al., 2010) BCI items were developed based on previous non-ESM measures (Vasconcelos e Sa et al., 2013) to include momentary 'direct influencing' and 'buffering' behavioural interactions. 'Direct influencing' behaviours refer to actions attempting to directly change the patient's behaviour, such as nagging or encouraging and were assessed using the items "nagging and encouraging"; and 'buffering' interactions represent behaviours aiming to take control or do things for the patient, such as helping, supervising or taking over and were assessed with the items "helping, taking control and keeping an eye on". Each time participants reported being in contact, a set of branching questions specific to BCI were presented, both at the current beep and for the time since the last beep. BCI items were mirrored: that is, patients reported (Yes/No) to the items "*Just before the beep went off this person was... & Since the last beep this person has been… encouraging me; nagging me; helping me; taking control of me; keeping an eye on me*."; while relatives reported (Yes/No) to the items "*Just before the beep went off I was... & Since the last beep I have been… encouraging him/her; nagging him/her; helping him/her; taking control of him/her; keeping an eye on him/her*."

Prior to starting the study, items were piloted with anonymous patients and relatives' consultants, who checked that items were relevant and reflected genuinely momentary experiences with which participants identify.

2.4.2. Non-ESM measures

2.4.2.1. Symptomatology. The PANSS (Kay et al., 1987) was completed prior the ESM phase to ascertain the presence of current psychotic symptoms (persecutory delusions and/or auditory hallucinations). Two assessors (DVS and SH) achieved good inter-rater reliability using 3 randomly selected PANSS interviews from a set of 25 from the current study (ICC=0.99).

2.4.2.2. Expressed Emotion (EE). The Camberwell Family Interview (Vaughn and Leff, 1976) was conducted individually with all participating relatives after the ESM phase. Critical comments (frequency count), hostility (0=no hostility to 3=hostility as both generalisation and rejection) and emotional over-involvement (EOI; 0=none to 5=marked EOI) were rated, and the conventional criteria were used to classify high-EE (that is: ≥6 critical comments, any hostility rating, or a rating of EOI≥3). EE categorisations and levels of criticism and EOI were used in the analyses. All EE codings were conducted by DVS following training with Dr. Vaughn. Interrater reliability was assessed from a random sample of 3 interviews of the 21 cases using a trained independent rater, who was unaware of the study hypothesis. 100% agreement on EE status was obtained, with good to absolute agreement on the critical comments (ICC=0.86) and EOI (ICC=1.00) sub-scales.

2.5. Statistical analyses

Multilevel models were used to account for the hierarchical structure of the ESM data, whereby beeps are nested within multiple days that are nested within participants; thus the traditional power calculations are inappropriate, as they do not account for such hierarchies (Kimhy et al., 2012). This study investigates associations

at a momentary level thus power can be determined by the number of data points entered (10 out of possible 60) (Kimhy et al., 2012). Furthermore, due to the demanding nature of the procedure and the richness of the clustered data, generally ESM samples tend to be modest but still allowing for reliable statistical analyses. Data were analysed using STATA (Version 12) employing the XTMIXED and XTMELOGIT commands adjusting for participant- and day- level random effects (intercepts); and were drawn from patients, relatives and dyads datasets. P-values are reported at a 0.01 significance level to reduce the likelihood of accepting chance findings that may result from conducting multiple analyses. The analysis strategy first investigated associations between predictor and outcome variables, followed by the examination of moderating effects of EE. Analyses were threefold for each hypothesis and will be referred to as such throughout the paper: momentary/current beep analyses (involved predictor variables relating to the time of the current beep); proximal/between beeps analyses (involved predictor variables measured at the current beep, but which related to the time period between the current and the previous beep); and lagged/previous beep analyses (involved predictor variables measured at the previous beep).

To test hypotheses examining moderating effects interaction terms and lagged interaction terms were created. The lagged interactions examine the effects of interaction terms measured at the previous beep on the outcome variables at the current beep. Separate time-lagged analyses were repeated with the insertion of these lagged variables in separate models. Lagged analyses did not control for previous beep outcome measures because random intercepts may correlate highly with lagged outcomes resulting in spurious findings.

2.5.1. Effect of contact and EE. To test whether contact with high-EE relatives was associated with patients' affect and symptoms, analyses were carried out in two stages. First, using the patients' dataset separate analyses were conducted entering patients' reported dyad contact as the independent variable into the model and patients' negative affect; positive affect; and symptoms as separate dependent variables. Second, using the dyads dataset separate analyses were conducted with the insertion of the moderator variables (EE status; criticism; EOI) and their interaction term with dyad contact as independent variables in separate models. The same analysis strategy using the relative's dataset was followed to assess the effect of relative's EE status on the association between relatives' reported dyad contact and relative's affect.

2.5.2. Effect of BCI. To investigate if patients' and relatives' reports of BCI (5 items) predicted the other member of the dyad's current affect and symptoms (for patients only), separate analyses using the patients' and relatives' datasets were conducted entering each BCI item as independent variables in separate models with negative affect; positive affect; and (for patients) symptoms as separate dependent variables.

2.5.3. Effect of patients' symptoms. To assess whether patients' reported symptoms predicted relatives' current affect and BCI, separate analyses using the dyad dataset were conducted entering patient's symptoms mean item score as the independent variable in separate models with relative's negative affect, positive affect and each of the 5 BCI items as separate dependent variables.

3. Results

3.1. Sample

Descriptive information for the patient-relative dyad sample (n=21) is provided in Table 1. Both patients and relatives provided data on average at over half of the sixty assessments (*M*=40.1, SD=10.6; *M*=45.4, SD=7.9, respectively). Appropriate statistical tests were used to compare those who completed the ESM phase and those who did not and no differences in terms of gender, relationship with patient, education level, employment, marital status, age and CFI length were found.

[INSERT TABLE 1 HERE]

Table 2 provides descriptive data for the contact and BCI ESM items.

[INSERT TABLE 2 HERE]

3.2. Contact and EE

Patients' contact with relatives (reported at the momentary, proximal and lagged levels) was not related with patients' current negative or positive affect, or with psychosis symptom experiences (Table 3). Further analyses revealed that neither EE status, nor criticism, nor EOI moderated the relationship between patient's reported contact with relative and patient's current affect or symptoms. When analyses were repeated using the lagged variables the results remained non-significant.

[INSERT TABLE 3 HERE]

Momentary, proximal and lagged analyses showed that relatives' reported contact with the patient, did not predict relative's current affect (Table 3). Further momentary, proximal and lagged regression analyses revealed that relative's EE status had no moderating effect on the association between contact with patient and relative's affect.

3.3 BCI

Patients' momentary reports of the relative 'taking control of' them significantly predicted higher levels of patients' current symptoms. No further significant associations were found for the remaining BCI items at the momentary and proximal

levels. Time-lagged analyses showed that patients' report of the relative helping them at the previous beep significantly predicted increased negative affect at the subsequent beep. The remaining associations in the time-lagged analyses were non-significant (Table 4).

[INSERT TABLE 4 HERE]

Relatives' momentary self-reports of nagging and taking control of the patient significantly predicted higher levels of relatives' current negative affect. Similarly, at the proximal level relatives reports of nagging, taking control and keeping an eye on the patient significantly predicted increased current negative affect in relatives. In addition, momentary and proximal self-reports of nagging, and proximal self-reports of taking control were significantly associated with decreased current positive affect in relatives. When analyses were run with the lagged variables, relative reports of nagging at the previous beep, significantly predicted increased negative affect at the subsequent beep. The remaining relatives' behavioural reports had no effect on relatives' affect (Table 5).

[INSERT TABLE 5 HERE]

3.4. Patients' symptoms

No significant associations were found between patients reported symptoms and relative's affect and self-reported BCI in either momentary or lagged analyses (Table 6).

[INSERT TABLE 6 HERE]

4. Discussion

As hypothesised, patient reported momentary BCI predicted patients' affect and symptom experiences. However, contact with high-EE relatives had no effect on patients' affect or symptoms. Similarly, for relatives in this study, reported BCI

attempts significantly predicted fluctuations in relatives' affect; but EE status did not moderate the association between contact with the patient and relatives' affect. Patients' symptoms did not influence relatives' affect or behavioural responses.

In this study contact with relatives did not predict patients' current affect or symptom experiences. This finding contrasts with prior research, which found that being in the presence of familiar others lessens the occurrence of delusional moments in individuals with psychosis (Myin-Germeys et al., 2001b), and the occurrence of abnormal perceptions in subjects with high vulnerability for psychosis (Verdoux et al., 2003). This discrepant result may be due to methodological differences: first, in the present study contact was restricted to a key relative, whereas in the previous two studies this distinction was not made; contact with familiar individuals included any contact with relatives, friends or partners; second, in Myin-Germeys (2001b)'s study only delusional moments were evaluated, whilst in this study patients' self-reports included delusional and hallucinatory momentary experiences. Moreover, one study demonstrated that individuals with high levels of trait paranoia report less paranoid thinking when among less-familiar company as compared to being with a familiar company (Collip et al., 2011). There is also evidence that change in social company over two ESM assessments can be a stronger predictor of psychotic experiences than the actual current social company (Verdoux et al., 2003). These inconsistencies in findings suggest that further 'real-world' momentary research is needed to clarify how being around relatives can impact on the variation of symptoms and affect. Furthermore, neither EE status, nor criticism or EOI, moderated the relationship between momentary contact with the relative and patients' current affect or symptoms, suggesting that the presence of high-EE per se does not influence current affect and symptoms experience in patients. This is consistent with Hahlweg (1989)'s

study which examined interactional patterns between recent-onset psychosis patients and their high/low-EE relatives using family interaction tasks in a laboratory setting, and found no association between relative's CFI EE ratings and their interactional behaviour.

This study revealed significant links between patients' reports of certain BCI and patients' affect and symptom experiences. Specifically we found that patients' immediate reports of their relatives taking control of them were associated with higher current symptom levels. Furthermore, patients' reports of their relatives helping them at the previous time-point predicted increases in negative affect at the subsequent time-point. One might have expected that perceived helping interactions would be associated with low or reduced negative affect. One possible, although speculative, explanation is that, even though these helping behaviours might be well intended, patients may perceive them as inappropriate or over engaging responses, impacting on their affect. This is to some extent comparable to the finding that relatives' overinvolved attitudes, usually manifested in overprotective or devoted behaviours, are associated with greater patient anxiety and depression (Bentsen et al., 1996). On the other hand, it might well be that relatives' helping attempts increase patients' awareness that they are not capable of helping themselves, fuelling feelings of frustration or hopelessness. Overall, these findings suggest that some momentary variations in patients' affect and symptoms are associated with their reports of relatives' behaviours, indicating that the measure of behavioural interactions rather than EE status is more sensitive to momentary fluctuations in patients' symptoms and affect. However, the link between high-EE and symptom exacerbation is one of the most robust findings in psychiatry, and it is possible that, with only twenty-one dyads,

the current study was underpowered to detect associations between EE and symptoms.

Relatives' reports that they were or had been taking control of the patient were linked with increases in their negative affect. Similarly, when relatives reported that they were or had been nagging the patient, they also felt significantly more sad/irritated as well as significantly less happy/satisfied. The relationship between nagging and relatives' affect persisted over time points, and were also significant in the lagged analyses. Decreases in positive affect were also evident when relatives reported that they had been taking control of the patient; and increases in low mood were also associated with relatives' reports that they had been keeping an eye on the patient. Overall, when relatives engage in a range of BCI, they also tend to experience (relatively persistent) increases in low mood as well as decreases in positive mood. Supervisory interactions like keeping an eye on the patient also seem to be associated with lower mood. Possibly the way relatives appraise interactions determines their emotional responses. Prior evidence suggests that negative evaluations of caregiving directly relate to carer stress (Kuipers et al., 2006) and that understanding relatives' beliefs and appraisals may help us identify those at risk of enduring problems (Barrowclough et al., 2014). Thus, clinical support offered to relatives should identify early on which beliefs and interactional styles are more adaptive. Modifying interactions might then improve relatives' own mood, predicting a better adjustment. Finally, our findings showed that patients' symptom severity had no effect on relatives' affect or behavioural responses. This result is consistent with previous research that used conventional retrospective assessment of control and found no significant links between patients symptomatology and controlling behaviours (Wuerker et al., 2002).

The following limitations should be acknowledged when interpreting the results. First, to guarantee that BCI were captured, participants were asked to self-report on these items both at the momentary and proximal levels. This repeated probing might have increased participants' self-awareness, making self-assessments more likely to be biased. Second, although data was collected in a longitudinal structure (up to 60 reports over 6 days) with synchronised dyads, it is not possible to determine whether BCI impact on affect and symptoms, or vice-versa. Nevertheless, it is plausible that relatives exert behavioural control depending on the types of symptoms that patients exhibit. For instance, Weisman and colleagues (1998) found that negative symptoms are more likely to be targets of criticism than positive symptoms. Possibly, negative symptoms are more likely to be seen by relatives as intentional and controllable or as personality characteristics, and therefore may more likely lead to behaviourally controlling responses. However, further research is required to clarify this matter. Third, many multilevel analyses of the data were conducted which could produce spurious results, although a more stringent significance level was adopted in the interpretation of the findings. Fourth, the majority of the sample was female and white British restricting the generalisablility of findings to other groups. The small sample size and skewness of some predictors may have resulted in an underpowered study. Finally, recruitment in dyads may have introduced a selection bias.

This exploratory study highlights the importance of integrating both relatives' and patients' perspectives of their daily interactions, and how these momentary interactions impact on psychotic experiences and affect. Our findings showed that high/low-EE contact within the patient-relative dyad per se had no impact on affect or, in the case of patients, symptoms. However, we found that patients' momentary

reports of BCI, such as taking control or helping behaviours relate to increased negative affect and symptoms. Similarly, we have established links between momentary self-reports of relatives' behavioural responses and their negative affect. Overall, these results indicate that 'negative' behavioural interactions relate simultaneously to increased negative affect both in patients and relatives, suggesting that these behavioural interplays within the dyad should be a focus of clinical interventions.

Evidence suggests that family interventions are effective at reducing patient psychotic relapse and readmissions (Pilling et al., 2002) as well as relatives' high levels of EE (Pfammatter et al., 2006; Pharoah et al., 2010). However, one key issue around family work is implementation. Rates of uptake to family interventions are very poor and this is mainly due to the lack of availability of suitable families, which may result from service recipients feeling disempowered, blamed or stigmatized (Berry and Haddock, 2008). This study may offer some guidance on this. For instance, acknowledging relatives controlling behaviours may provide a less stigmatising way to establish rapport with families that may be more reluctant to engage with services. Similarly, increasing families and staff awareness about the concept of behavioural control, conceptualising it as an everyday response that may be experienced as a stressor by more vulnerable patients, may allow relatives' behavioural patterns to be better understood and more positively reframed. For example, this study provided evidence that helping behaviours could impact patients negatively, possibly being perceived as inappropriate attempts to provide help. Reframing these behaviours as genuine efforts to ameliorate the situation may provide a better way to engage with families.

These novel findings emphasise the need to incorporate patients' and relatives' reports of behavioural responses when delivering psychoeducational and clinical interventions; and to explore the contribution of specific behavioural interactions to patient's and relative's distress. ESM provides a closer insight into how certain types of BCI play a significant role on the experience of symptoms and affect in patient-relative dyads.

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Table 1

Descriptive information for the patient-relative dyad sample (n= 21)

	Patients		Relatives	
	Frequency	Percentage	Frequency	Percentage
Gender				
Female/Male	6/15	28.6/71.4	20/1	95.2/4.8
Marital status				
Single	13	61.9	2	9.5
Married	4	19.0	14	66.7

Cohabitating	2	9.5	2	9.5
Divorced	2	9.5	2	9.5
Widowed			1	4.8
Ethnicity				
White	21	100.0	21	100.0
Occupational status				
Employed (part-time)	2	9.5	5	23.8
Employed (full-time)			2	9.5
Voluntary	1	4.8		
Student	4	19.0		
Home duties	1	4.8	2	9.5
Retired			6	28.6
Unemployed	13	61.9	6	28.6
Highest level of education				
Primary	2	9.5	2	9.5
Secondary	7	33.3	9	42.9
Further	8	38.1	5	23.8
Higher	4	19.0	5	23.8
Diagnosis				
First episode psychosis	7	33.3		
Schizophrenia	8	38.1		
Schizoaffective	1	4.8		
Psychotic disorder (NOS)	2	9.5		
Unspecified non-organic psychosis	3	14.3		
Trust type				

EIS	11	52.4		
CMHT	9	42.9		
Other	1	4.8		
Living arrangements				
With relative(s)	20	95.2		
Other	1	4.8		
Relationship with patient				
Natural mother			12	57.1
Natural father			1	4.8
Sibling			1	4.8
Partner			6	28.6
Other blood relative			1	4.8
Expressed Emotion				
High/low			12/9	57.1/42.9
High EE (CC only)				
High EE (hostility only)				
High EE (EOI only)			4	19.0
High EE (CC & hostility)				
High EE (CC & EOI)			4	19.0
High EE (hostility and EOI)				
High EE (CC, hostility & EOI)			4	19.0
	Mean (*SD*)	Min-Max	Mean (*SD*)	Min-Max
Age	26*	19-51	52 (*13.9*)	22-79
Weekly contact hours with patient			40*	7-168
CFI length (in minutes)			66*	32-97

Critical comments	3.0*	0-11
Hostility	0.0*	0-2
EOI	2.0*	0-4
Warmth	2.9 (*1.2*)	1-5
Positive remarks	2.0*	0-6

Note. *Median reported for non-normally distributed variable

Abbreviations: NOS= not otherwise specified; EIS= early intervention service; CMHT= community mental health team; CC= critical comments; EOI= emotional overinvolvement, SD= standard deviation

Table 2

Descriptives for contact with other participant and BCI items

ESM item reported by relatives (n= 23)	Total obs.	Total obs. item was endorsed (Yes)	Mean (*SD*)	Min-Max
Contact with other participant	615	400	0.65 (0.48)	0-1
Encouraging	400	73	0.18 (0.39)	0-1
Nagging	400	22	0.06 (0.23)	0-1
Helping	400	83	0.21 (0.41)	0-1
Taking control	400	8	0.02 (0.14)	0-1
Keeping eye on	400	117	0.29 (0.46)	0-1
ESM item reported by patients (n= 25)	Total obs.	Total obs. item was endorsed (Yes)	Mean (*SD*)	Min-Max
Contact with other participant	550	373	0.68 (0.47)	0-1

Encouraging	373	55	0.15 (0.36)	0-1
Nagging	373	11	0.03 (0.17)	0-1
Helping	373	77	0.21 (0.41)	0-1
Taking control	373	4	0.01 (0.10)	0-1
Keeping eye on	373	165	0.44 (0.50)	0-1

Note. Obs.= observations, *SD*= standard deviation

Table 3

Effect of contact on affect and symptoms (reported by patients, n= 25); and effect of contact on affect (reported by relatives, n= 23)

	Patients			Relatives		
	β	95% CI	p	β	95% CI	p
Negative affect						
MA	0.02	[-0.15, 0.18]	0.85	0.11	[-0.05, 0.27]	0.19
PA	-0.08	[-0.20, 0.03]	0.16	0.01	[-0.10, 0.12]	0.84
LA	-0.15	[-0.35, 0.06]	0.17	0.05	[-0.14, 0.24]	0.60
Positive affect						
MA	0.02	[-0.18, 0.21]	0.87	-0.06	[-0.26, 0.13]	0.53
PA	0.12	[-0.01, 0.25]	0.07	0.10	[-0.03, 0.23]	0.12
LA	0.12	[-0.11, 0.34]	0.32	-0.24	[-0.47, -0.01]	0.04
Symptoms						
MA	-0.04	[-0.19, 0.11]	0.62	-	-	-
PA	-0.00	[-0.11, 0.10]	0.97	-	-	-
LA	-0.14	[-0.32, 0.04]	0.14	-	-	-

Note. CI= confidence interval, MA= momentary analyses, PA= proximal analyses,

LA= lagged analyses

Table 4

Effect of BCI on affect and symptoms (reported by patients, n= 25)

	Negative affect			Symptoms		
	β	95% CI	p	β	95% CI	p
Encouraging						
MA	-0.27	[-0.51, -0.02]	0.03	-0.01	[-0.23, 0.21]	0.90
PA	-0.06	[-0.25, 0.13]	0.54	-0.03	[-0.20, 0.13]	0.70
LA	-0.04	[-0.32, 0.24]	0.76	0.18	[-0.07, 0.44]	0.16
Nagging						
MA	0.22	[-0.23, 0.67]	0.33	0.15	[-0.25, 0.55]	0.46
PA	0.25	[-0.09, 0.59]	0.15	0.09	[-0.21, 0.38]	0.56
LA	0.62	[0.11, 1.13]	0.02	0.19	[-0.28, 0.65]	0.43
Helping						
MA	0.01	[-0.22, 0.24]	0.94	0.02	[-0.18, 0.23]	0.82
PA	0.10	[-0.01, 0.29]	0.33	-0.08	[-0.24, 0.09]	0.35
LA	0.32	[0.08, 0.56]	0.01*	0.17	[-0.05, 0.39]	0.13
Taking control						
MA	0.85	[0.11, 1.59]	0.03	1.08	[0.42, 1.74]	0.00*
PA	-0.61	[-1.12, -0.09]	0.02	-0.44	[-0.88, 0.01]	0.05
LA	0.71	[-0.03, 1.45]	0.06	0.65	[-0.04, 1.33]	0.07
Keeping eye on						
MA	-0.27	[-0.51, -0.04]	0.02	0.00	[-0.20, 0.21]	0.98
PA	-0.01	[-0.22, 0.20]	0.91	0.09	[-0.09, 0.27]	0.32

LA	0.08	[-0.18, 0.34]	0.53	0.11	[-0.12, 0.34]	0.36

Note. CI= confidence interval, MA= momentary analyses, PA= proximal analyses, LA= lagged analyses. *p<0.01

Table 5

Effect of BCI on affect (reported by relatives, n=23)

	Negative affect			Positive affect		
	β	95% CI	p	β	95% CI	p
Encouraging						
MA	0.07	[-0.20, 0.33]	0.63	-0.12	[-0.42, 0.19]	0.46
PA	-0.04	[-0.23, 0.15]	0.70	0.23	[0.02, 0.45]	0.03
LA	0.23	[-0.09, 0.55]	0.16	0.11	[-0.22, 0.48]	0.47
Nagging						
MA	1.23	[0.86, 1.61]	<0.00*	-0.63	[-1.07, -0.18]	0.01*
PA	.097	[0.67, 1.28]	<0.00*	-.060	[-0.95, -0.25]	0.00*
LA	1.10	[0.64, 1.56]	<0.00*	-0.40	[-0.92, 0.12]	0.13
Helping						
MA	0.05	[-0.19, 0.30]	0.67	-0.01	[-0.29, 0.26]	0.93
PA	0.06	[-0.14, 0.26]	0.58	0.09	[-0.14, 0.31]	0.46
LA	0.04	[-0.25, 0.32]	0.80	0.11	[-0.20, 0.41]	0.50
Taking control						
MA	0.88	[0.18, 1.58]	0.01*	-0.57	[-1.37, 0.24]	0.17
PA	0.81	[0.39, 1.22]	< 0.00*	-0.82	[-1.29, -0.36]	0.00*
LA	0.78	[0.05, 1.51]	0.04	-0.58	[-1.38, 0.23]	0.16
Keeping eye on						

MA	0.26	[0.04, 0.49]	0.02	-0.06	[-0.33, 0.20]	0.65
PA	0.48	[0.27, 0.70]	<0.00*	-0.03	[-0.28, 0.22]	0.83
LA	0.17	[-0.09, 0.43]	0.21	-0.23	[-0.51, 0.06]	0.12

Note. CI= confidence interval, MA= momentary analyses, PA= proximal analyses, LA= lagged analyses

*p<0.01

Table 6

Effect of patients' symptoms on relatives' affect and BCI (n=21)

	β	95% CI	p
Negative affect			
MA	0.03	[-0.05, 0.10]	0.52
LA	0.01	[-0.07, 0.08]	0.90
Positive affect			
MA	-0.04	[-0.13, 0.05]	0.37
LA	0.01	[-0.09, 0.11]	0.81
	OR	95% CI	p
Encouraging			
MA	0.50	[-0.12, 1.12]	0.11
LA	0.23	[-0.33, 0.78]	0.43
Nagging			
MA	0.15	[-0.45, 0.74]	0.63
LA	-0.11	[-0.73, 0.51]	0.73
Helping			
MA	0.37	[-0.12, 0.85]	0.14

LA	0.22	[-0.22, 0.65]	0.33
Taking control			
MA	-0.58	[-2.10, 0.93]	0.45
LA	-0.73	[-2.28, 0.83]	0.36
Keeping eye on			
MA	0.28	[-0.22, 0.77]	0.27
LA	0.33	[-0.12, 0.77]	0.15

Note. OR= odds ratio, CI= confidence interval, MA= momentary analyses, LA= lagged analyses